

APPENDIX G
RECCO, HDOB, MINOB, AND TEMP DROP
CODES, TABLES, AND REGULATIONS

DATE				ORGANIZATION				MISSION IDENTIFIER											
OBSERVATION NUMBER	9	RECCO INDICATOR SPECIFYING TYPE OF OBSERVATION <i>Table 1</i>	Q	TIME OF OBSERVATION (Hours and Minutes) (GMT)	Y	DAY OF WEEK SUN-1	L _o	LONGITUDE	h _a	PRESSURE ALTITUDE OF AIRCRAFT REPORTED TO THE NEAREST DECAMETER	d	WIND DIRECTION AT FLIGHT LEVEL (Tens of deg. true.)	T	TEMPERATURE WHOLE °C	/	INDICATOR			
	X		Q		OCTANT <i>Table 3</i>	L _o	DEGREES AND TENTHS (<i>Note 4</i>)	h _a	d		T	(<i>Note 6</i>)	J	INDEX TO <i>Table 9</i>					
	X		g		L _a	LATITUDE	h _a	f	WIND SPEED AT FLIGHT LEVEL (Knots)		T _d	DEW POINT WHOLE °C	H	GEOPOTENTIAL HEIGHT/ D-VALUE OR SLP PER INDEX					
	X		g		L _a	DEGREES AND TENTHS	B	TURBULENCE <i>Table 4</i>	d _t		TYPE OF WIND <i>Table 6</i>	f	T _d	H					
	9	i _d	L _a	DEW POINT INDICATOR <i>Table 2</i>	f _c	FLIGHT COND <i>Table 5</i>	d _a	METHOD OF OBTAINING WIND <i>Table 7</i>	f	w	PRESENT WEATHER (<i>Note 7 Table 8</i>)	H	(<i>Note 8</i>)						
1		2		3		4		5		6		7		8					
REMARKS																			

TYPE AIRCRAFT				CALL SIGN				METEOROLOGIST							
1	INDICATOR	C	CLOUD TYPE <i>Table 11</i>	C	CLOUD TYPE <i>Table 11</i>	C	CLOUD TYPE <i>Table 11</i>	1	INDICATOR	C	CLOUD TYPE <i>Table 11</i>	C	CLOUD TYPE <i>Table 11</i>	C	CLOUD TYPE <i>Table 11</i>
k _n	NR OF CLOUD LAYERS (<i>Note 9</i>)	h _s	ALTITUDE OF BASE <i>Table 12</i>	h _s	ALTITUDE OF BASE <i>Table 12</i>	h _s	ALTITUDE OF BASE <i>Table 12</i>	K _n	NR OF CLOUD LAYERS (<i>Note 9</i>)	h _s	ALTITUDE OF BASE <i>Table 12</i>	h _s	ALTITUDE OF BASE <i>Table 12</i>	h _s	ALTITUDE OF BASE <i>Table 12</i>
N _s	AMOUNT OF CLOUDS (<i>Note 9</i>) <i>Table 10</i>	H _t	ALTITUDE OF TOP <i>Table 12</i>	H _t	ALTITUDE OF TOP <i>Table 12</i>	H _t	ALTITUDE OF TOP <i>Table 12</i>	N _s	AMOUNT OF CLOUDS (<i>Note 9</i>) <i>Table 10</i>	H _t	ALTITUDE OF TOP <i>Table 12</i>	H _t	ALTITUDE OF TOP <i>Table 12</i>	H _t	ALTITUDE OF TOP <i>Table 12</i>
9	10	11	12	13	14	15	16								
REMARKS															

RECCO RECORDING WORKSHEET															
4	INDICATOR	6	INDICATOR (<i>Note 11</i>)	6	INDICATOR (<i>Note 11</i>)	7	INDICATOR	7	INDICATOR	8	INDICATOR	8	INDICATOR	9	INDICATOR
d	DIRECTION OF SFC WIND (Tens of deg. true)	w _s	SIGNIFICANT WEATHER CHANGES <i>Table 14</i>	w _s	SIGNIFICANT WEATHER CHANGES <i>Table 14</i>	i _r	RATE OF ICING <i>Table 17</i>	h _i	ALT OF BASE OF ICING STRATUM (<i>Note 12</i>) <i>Table 12</i>	d _r	BEARING OF ECHO CENTER (Tens of Deg. True)	e _w	ECHO WIDTH OR DIAMETER <i>Table 19</i>	v _i	INFLIGHT VISIBILITY <i>Table 23</i>
d		s _s	DISTANCE OF OCCURRENCE OF W _s <i>Table 15</i>	s _s	DISTANCE OF OCCURRENCE OF W _s <i>Table 15</i>	i _t	TYPE OF ICING <i>Table 18</i>	h _i		d _r		e _i	LENGTH OF MAJ AXIS <i>Table 19</i>	t _w	SEA SURFACE TEMPERATURE DEGREES AND TENTHS
f	SURFACE WIND SPEED (<i>Note 10</i>)	w _d	DISTANT WEATHER <i>Table 16</i>	w _d	DISTANT WEATHER <i>Table 16</i>	s _b	DISTANCE TO BEGINNING OF ICING <i>Table 15</i>	h _i	ALTITUDE OF TOP OF ICING STRATUM (<i>Note 12</i>) <i>Table 12</i>	s _r	DISTANCE TO ECHO CENTER <i>Table 19</i>	c _e	CHARACTER OF ECHO <i>Table 21</i>	t _w	
f		d _w	BEARING OF <i>Table 13</i>	d _w	BEARING OF <i>Table 13</i>	s _a	DISTANCE TO ENDING OF ICING <i>Table 15</i>	h _i		o _e	ORIENTATION OF ELLIPSE <i>Table 20</i>	i _e	INTENSITY OF ECHO <i>Table 22</i>	t _w	
17		18		19		20		21		22		23		24	
REMARKS															

Figure G-1. Reconnaissance code recording form

Table G-1. Reconnaissance code tables

TABLE 1 XXX

222 Sec One Observation without radar capability
555 Sec Three (intermediate) observation with or without radar capability
777 Sec One Observation with radar capability

TABLE 2 i_d

0 No dew point capability/acft below 10,000 meters
1 No dew point capability/acft at or above 10,000 meters
2 No dew point capability/acft below 10,000 meters and flight lvl temp - 50EC or colder
3 No dew point capability/acft at or above 10,000 meters and flight lvl temp -50EC or colder
4 Dew point capability/acft below 10,000 meters
5 Dew point capability/acft at or above 10,000 meters
6 Dew point capability/acft below 10,000 meters and flight lvl temp - 50EC or colder
7 Dew point capability/acft at or above 10,000 meters and flight lvl temp - 50EC or colder

TABLE 3 Q

0 0E -90E W	<u>Northern</u>
1 90E W - 180E	<u>Northern</u>
2 180E - 90E E	<u>Northern</u>
3 90E - 0E E	<u>Northern</u>
4 Not Used	
5 0E - 90E W	<u>Southern</u>
6 90E W - 180E	<u>Southern</u>
7 180E - 90E E	<u>Southern</u>
8 90E - 0E E	<u>Southern</u>

TABLE 4 B

0 None
1 Light turbulence
2 Moderate turbulence in clear air, infrequent
3 Moderate turbulence in clear air, frequent
4 Moderate turbulence in cloud, infrequent
5 Moderate turbulence in cloud, frequent
6 Severe Turbulence in clear air, infrequent
7 Severe Turbulence in clear air, frequent
8 Severe Turbulence in cloud, infrequent
9 Severe Turbulence in cloud, frequent

TABLE 5 f_c

0 In the clear
8 In and out of clouds
9 In clouds all the time (continuous IMC)
/ Impossible to determine due to darkness or other cause

TABLE 6 d_t

0 Spot of Wind
1 Average wind
/ No wind reported

TABLE 7 d_a

0 Winds obtained using doppler radar or inertial systems
1 Winds obtained using other navigation equipment and/or techniques
/ Navigator unable to determine or wind not compatible

TABLE 8 w

0 Clear
1 Scattered (trace to 4/8 cloud coverage)
2 Broken (5/8 to 7/8 cloud coverage)
3 Overcast/undercast
4 Fog, thick dust or haze
5 Drizzle
6 Rain (continuous or intermittent precip - from stratiform clouds)
7 Snow or rain and snow mixed
8 Shower(s) (continuous or intermittent precip - from cumuliform clouds)
9 Thunderstorm(s)
/ Unknown for any cause, including darkness

TABLE 9 j

0 Sea level pressure in whole millibars (thousands fig if any omitted)
1 Altitude 200 mb surface in geopotential decameters (thousands fig if any omitted)
2 Altitude 850 mb surface in geopotential meters (thousands fig omitted)
3 Altitude 700 mb surface in geopotential meters (thousands fig omitted)
4 Altitude 500 mb surface in geopotential decameters
5 Altitude 400 mb surface in geopotential decameters
6 Altitude 300 mb surface in geopotential decameters
7 Altitude 250 mb surface in geopotential decameters (thousands fig if any omitted)
8 D - Value in geopotential decameters; if negative 500 is added to HHH
9 Altitude 925 mb surface in geopotential meters
/ No absolute altitude available or geopotential data not within ± 30 meters/4 mb accuracy requirements

TABLE 10 N_s

0 No additional cloud layers (place holder)
1 1 okta or less, but not zero (1/8 or less sky covered)
2 2 oktas (or 2/8 of sky covered)
3 3 oktas (or 3/8 of sky covered)
4 4 oktas (or 4/8 of sky covered)
5 5 oktas (or 5/8 of sky covered)
6 6 oktas (or 6/8 of sky covered)
7 7 oktas or more but not 8 oktas
8 8 oktas or sky completely covered
9 Sky obscured (place holder)

TABLE 11 C

0 Cirrus (Ci)
1 Cirrocumulus (Cc)
2 Cirrostratus (Cs)
3 Altopumulus (Ac)
4 Altostratus (As)
5 Nimbostratus (Ns)
6 Stratocumulus (Sc)
7 Stratus (St)
8 Cumulus (Cu)
9 Cumulonimbus (Cb)
/ Cloud type unknown due to darkness or other analogous phenomena

TABLE 12 h_sh_sH_tH_th_ih_iH_iH_i

00	Less than 100
01	100 ft
02	200 ft
03	300 ft
	etc, etc
49	4,900 ft
50	5,000 ft
51-55	Not used
56	6,000 ft
57	7,000 ft
	etc, etc
79	29,000 ft
80	30,000 ft
81	35,000 ft
82	40,000 ft
	etc, etc
89	Greater than 70,000 ft
//	Unknown

TABLE 13 d_w

0	No report	5 SW
1	NE	6 W
2	E	7 NW
3	SE	8 N
4	S	9 all directions

TABLE 14 W_s

0 No change
1 Marked wind shift
2 Beginning or ending or marked turbulence
3 Marked temperature change (not with altitude)
4 Precipitation begins or ends
5 Change in cloud forms
6 Fog or ice fog bank begins or ends
7 Warm front
8 Cold Front
9 Front, type not specified

TABLE 15 S_bS_eS_s

0 No report
1 Previous position
2 Present position
3 30 nautical miles
4 60 nautical miles
5 90 nautical miles
6 120 nautical miles
7 150 nautical miles
8 180 nautical miles
9 More than 180 nautical miles
/ Unknown (not used for S_s)

Table G-1. Reconnaissance code tables (continued)

TABLE 16 w_d

- 0 No report
- 1 Signs of a tropical cyclone
- 2 Ugly threatening sky
- 3 Duststorm or sandstorm
- 4 Fog or ice fog
- 5 Waterspout
- 6 Cirrostratus shield or bank
- 7 Altostratus or altocumulus shield or bank
- 8 Line of heavy cumulus
- 9 Cumulonimbus heads or thunderstorms

TABLE 17 I_r

- 7 Light
- 8 Moderate
- 9 Severe
- / Unknown or contrails

TABLE 18 I_t

- 0 None
- 1 Rime ice in clouds
- 2 Clear ice in clouds
- 3 Combination rime and clear ice in clouds
- 4 Rime ice in precipitation
- 5 Clear ice in precipitation
- 6 Combination rime and clear ice in precip
- 7 Frost (icing in clear air)
- 8 Nonpersistent contrails (less than 1/4 nautical miles long)
- 9 Persistent contrails

TABLE 19 S_r, E_w, E_l

- 0 0NM 5 50NM
- 1 10NM 6 60-80NM
- 2 20NM 7 80-100NM
- 3 30NM 8 100-150NM
- 4 40NM 9 Greater than 150NM
- / Unknown

TABLE 20 O_e

- 0 Circular
- 1 NNE - SSW
- 2 NE - SW
- 3 ENE - WSW
- 4 E - W
- 5 ESE - WNW
- 6 SE - NW
- 7 SSE - NNW
- 8 S - N
- / Unknown

TABLE 21 c_e

- 1 Scattered Area
- 2 Solid Area
- 3 Scattered Line
- 4 Solid Line
- 5 Scattered, all quadrants
- 6 Solid, all quadrants
- / Unknown

TABLE 22 i_e

- 2 Weak
- 5 Moderate
- 8 Strong
- / Unknown

TABLE 23 V_i

- 1 Inflight visibility 0 to and including 1 nautical mile
- 2 Inflight visibility greater than 1 and not exceeding 3 nautical miles
- 3 Inflight visibility greater than 3 nautical miles

RECCO SYMBOLIC FORM

SECTION ONE (MANDATORY)

9XXX9 GGggi_d YQL_aL_aL_a L_oL_oL_oBf_c h_ah_ah_ad_td_a

ddfff TTT_dT_dw /jHHH

SECTION TWO (ADDITIONAL)

1k_nN_sN_sN_s Ch_sh_sH_tH_t 4ddff

6W_sS_sW_dd_w 7I_rI_tS_bS_e 7h_ih_iH_iH_i 8d_rd_rS_rO_e

8E_wE_lc_ei_e 9V_iT_wT_wT_w

SECTION THREE (INTERMEDIATE)

9XXX9 GGggi_d YQL_aL_aL_a L_oL_oL_oBf_c h_ah_ah_ad_td_a

ddfff TTT_dT_dw /jHHH

Table G-2. Reconnaissance code regulations

1. At the time of the observation the aircraft observing platform is considered to be located on the axis of a right vertical cylinder with a radius of 30 nautical miles bounded by the earth's surface and the top atmosphere. Present weather, cloud amount and type, turbulence, and other subjective elements are reported as occurring within the cylinder. Flight level winds, temperature, dew point, and geopotential values are sensed or computed and reported as occurring at the center of the observation circle. Radar echoes, significant weather changes, distant weather, and icing are phenomena that may also be observed/reported. Code groups identifying these phenomena may be reported as necessary to adequately describe met conditions observed.
2. The intermediate observation (Section Three) is reported following Section One (or Section Two if appended to Section One) in the order that it was taken.
3. Plain language remarks may be added as appropriate. These remarks follow the last encoded portion of the horizontal or vertical observation and will clearly convey the intended message. Vertical observations will not include meteorological remarks. These remarks must begin with a letter or word-e.g. "FL TEMP" vice "700 MB FL TEMP." The last report plain language remarks are mandatory, i.e., "LAST REPORT. OBS 01 thru 08 to KNHC, OBS 09 and 10 to KBIX."
4. The hundreds digit of longitude is omitted for longitudes from 100E to 180E.
5. Describe conditions along the route of flight actually experienced at flight level by aircraft.
6. TT, T_dT_d. When encoding negative temperatures, 50 is added to the absolute value of the temperature with the hundreds figure, if any, being omitted. A temperature of -52EC is encoded as 02, the distinction between -52EC and 2EC being made from i_d. Missing or unknown temperatures are reported as //. When the dew point is colder than -49.4EC, Code T_dT_d as // and report the actual value as a plain language remark - e.g. "DEW POINT NEG 52EC".
7. When two or more types of w co-exist, the type with the higher code figure will be reported. Code Figure 1, 2 and 3 are reported based on the total cloud amount through a given altitude, above or below the aircraft, and when other figures are inappropriate. The summation principle applies only when two or more cloud types share a given altitude.
8. When j is reported as a /, HHH is encoded as ///.
9. If the number of cloud layers reported exceeds 3, k_n in the first 1-group reports the total number of cloud layers. The second 1-group reports the additional number of layers being reported exclusive of those previously reported. In those cases where a cloud layer(s) is discernible, but a descriptive cloud picture of the observation circle is not possible, use appropriate remarks such as "Clouds Blo" or "As Blo" to indicate the presence of clouds. In such cases, coded entries are not made for group 9. The sequence in which cloud amounts are encoded depends upon type of cloud, cloud base, and vertical extent of the cloud. The cloud with the largest numerical value of cloud type code (C) is reported first, regardless of coverage, base, or vertical extent. Among clouds of the same cloud type code, sharing a common base, the cloud of greatest vertical extent is reported first. The summation principle is not used; each layer is treated as though no other clouds were present. The total amount of clouds through one altitude shared by several clouds will not exceed 8 oktas. Only use code figure 0 as a placeholder when you can determine that no additional cloud layers exist. In case of undercast, overcast, etc., use code figure 9 as a placeholder.
10. Due to limitations in the ability to distinguish sea state features representative of wind speeds above 130 knots, surface wind speeds in excess of 130 knots will not be encoded. Wind speeds of 100 to 130 knots inclusive will be encoded by deleting the hundreds figure and adding 50 to dd. For wind speeds above 130 knots, dd is reported without adding 50 and ff is encoded as // with a plain language remark added, i.e., "SFC WIND ABOVE 130 KNOTS."
11. Significant weather changes which have occurred since the last observation along the track are reported for W_s.
12. When aircraft encounters icing in level flight, the height at which the icing occurred will be reported for h_ih_i. The H_iH_i will be reported as //.

HDOB messages are created automatically by system software. Each consists of 20 lines of HD/HA data. Within an HDOB message, the time interval between individual HD/HA observations (the encoding interval) can be set by the operator to be either 30 seconds, 1 minute, or 2 minutes. Regardless of the encoding interval, all HD/HA meteorological parameters except MMM (maximum wind speed, Table G-3) represent 30-second averages ending at the time of the HD/HA observation. The maximum wind speed, however, is the highest 10-sec average wind speed occurring during the encoding interval.

Samples of HDOB messages using different encoding intervals are shown below. HDOB messages with 30 second, 1 minute, and 2 minute encoding intervals will be generated and transmitted every 10 minutes, 20 minutes, and 40 minutes, respectively.

SXXX50 KNHC 040952
 AF967 1017A OPAL HDOB 39
 0942. 2643N 08846W 03036 5374 127 106 140 136 112 02680 0000000000
 0943 2641N 08847W 03036 5442 116 116 136 136 120 02612 0000000000
 0943. 2640N 08849W 03065 5521 100 087 140 140 099 02561 0000000000
 0944 2638N 08850W 03028 5591 087 059 186 160 074 02454 0000000000
 0944. 2637N 08850W 03053 5630 097 028 202 158 036 02440 0000000000
 0945 2635N 08850W 03059 5647 197 009 218 148 018 02429 0000000000

⋮

30-second data interval

SXXX50 KNHC 040952
 AF967 1017A OPAL HDOB 39
 0942 2644N 08844W 03039 5333 135 094 138 136 096 02724 0000000000
 0943 2641N 08847W 03036 5442 116 116 136 136 120 02612 0000000000
 0944 2638N 08850W 03028 5591 087 059 186 160 099 02454 0000000000
 0945 2635N 08850W 03059 5647 197 009 218 148 036 02429 0000000000
 0946 2632N 08849W 03028 5632 274 052 226 148 067 02413 0000000000
 0947 2628N 08849W 03057 5488 271 118 194 130 124 02587 0000000000

⋮

1-minute data interval

SXXX50 KNHC 040952
 AF967 1017A OPAL HDOB 39
 0942 2644N 08844W 03039 5333 135 094 138 136 096 02724 0000000000
 0944 2638N 08850W 03028 5591 087 059 186 160 120 02454 0000000000
 0946 2632N 08849W 03028 5632 274 052 226 148 067 02413 0000000000
 0948 2625N 08849W 03050 5378 263 113 172 140 124 02690 0000000000
 0950 2620N 08849W 03047 5268 259 094 142 134 109 02797 0000000000
 0952 2614N 08849W 03044 5217 262 075 162 108 090 02845 0000000000

⋮

2-minute data interval

Figure G-2. HDOB Description and Sample Messages

Table G-3. HDOB Message Format

HHMM L_aL_ammH L_oL_oL_ommH PPPPP DDDD WWW SSS TTT ddd MMM RRRRR FFFFFFFFFF

HHMM:	The time of observation in hours and minutes (UTC). A period following HHMM indicates a data time of 30 seconds past the minute.
L _a L _a mmH:	The latitude of the observation in degrees, minutes and hemisphere (N or S).
L _o L _o L _o mmH:	The longitude of the observation in degrees, minutes and hemisphere (E or W).
PPPPP:	The pressure altitude in meters.
DDDD:	The absolute value of the D-value in meters (a 5 occupies the thousands place if the D-value is negative. For example, -34m is encoded as 5034.
WWW:	The wind direction in degrees, with 0 being true north, increasing clockwise.
SSS:	<i>The 30-second average wind speed in knots.</i>
TTT:	The air temperature in degrees and tenths Celsius. The tenths digit is even for temperatures at or above 0EC, odd for temperatures below 0EC.
ddd:	The dew point temperature, encoded the same way as air temperature.
MMM:	<i>The maximum 10-second average wind speed in knots measured during the encoding interval of 30 seconds, 1 minute, or 2 minutes.</i>
RRRRR:	Radar altitude in meters
FFFFFFFFF:	Default status for the MINOB/HDOB data. A "1" indicates the parameter is defaulted (suspect value) or based on a parameter that is defaulted. A "0" indicates the value is not defaulted. The field indicate default for (in order): latitude, longitude, pressure altitude, D-value, wind direction, wind speed, air temperature, dew point, maximum wind speed, radar altimeter.

MinOb messages are created automatically by the NOAA P-3 Research Aircraft Measurement System (RAMS). Each MinOb message contains one or more lines of flight level data. Each line consists of data parameters, averaged over an operator-selected sample interval (common settings are 30 seconds and 1 minute). The time interval for collecting lines in a block before forming a message for transmission is also selectable, typically 10 or 15 minutes. The message length is based on the operator's selection of sample interval and block length, but will never exceed 3300 characters (approximately 50 lines) due to satellite transmission protocol limits.

Each line is terminated with an ASCII <cr><cr><lf> sequence (Hex 0D 0D 0A). The line length is variable, depending on whether the optional Stepped Frequency Microwave Radiometer (SFMR) fields are included (see Table G-4 description). All fields are separated by at least one ASCII blank (Hex 20) as shown in the Table by a . symbol.

```
URNT40 KWBC 261950
NOAA3 WX02A BONNIE
194030 3136 07758 6849 +0152 251053 +171 +106 251054 040 005
194100 3138 07758 6847 +0148 247053 +171 +102 249053 040 005
194130 3141 07758 6849 +0146 246053 +166 +106 247053 039 005
194200 3143 07758 6851 +0144 246054 +162 +111 246054 039 004
194230 3145 07758 6849 +0141 246053 +162 +112 246054 999 999
194300 3147 07558 6852 +0134 245053 +160 +114 245053 039 004
194330 3149 07759 6845 +0126 247052 +162 +110 247052 038 000
```

.

30-Second Data Interval (with optional SFMR data)

Note: Differences from the Air Force HDOB message include the following:

- C Time code includes seconds, rather than a period to show 30-second mark
- C Latitude and longitude hemispheres are denoted by a minus sign rather than an alphabetic character (N,S,E,W)
- C Pressure altitudes and D-values are in feet
- C D-value sign is explicit, rather than coded as a leading `5'
- C Temperature and dewpoint signs are explicit, rather than making tenths odd/even
- C There is no radar altitude or default status
- C There may be SFMR data fields

Figure G-3. MinOb Description and Sample Message

Table G-4. NOAA MinOb Message Format

HHMMSS. L _a L _a L _a mm. L _o L _o L _o mm. PPPPP. ±DDDD. WWWSSS. ±TTT. ±ddd. wwwsss. sss. rrr	
HHMMSS	The time of the observation in hours, minutes and seconds (UTC). All averages (except peak wind) are centered around this time.
L _a L _a L _a mm	The latitude of the observation in degrees and minutes. A negative number signifies the Southern hemisphere. There may be leading blanks in the degree subfield; the minutes will always be a two digit numeric (zero filled as required).
L _o L _o L _o mm	The longitude of the observation in degrees and minutes. A negative number signifies the Eastern hemisphere. NOTE: This is opposite the normal convention. There may be leading blanks in the degree subfield; minutes will always be a two digit numeric.
PPPPP	The pressure altitude in feet. There may be leading blanks.
±DDDD	The D-value (Geopotential Altitude - Pressure Altitude) in feet. There will always be a leading sign (+ or -) followed by four numeric characters (leading zeros if required)
WWW	The wind direction in degrees, with 0 being true North, increasing clockwise. There will always be three numeric characters, with leading zeros if required.
SSS	The wind speed in knots. There will always be three numeric characters, with leading zeros if required.
±TTT	The air temperature in degrees and tenths Celsius. There will always be a leading sign (+ or -) followed by three numeric characters (leading zeros if required). For example, 5.3 C would be coded +053.
±ddd	The dewpoint temperature, encoded the same way as air temperature.
www	The direction of the peak wind during this interval (30 sec, 1 min, etc.). The peak wind is defined as the maximum 10 second average wind. Format is the same as wind direction above.
sss	The speed of the peak wind in knots. Format is the same as wind speed above.
sss	The wind speed at the surface in knots, as measured by the Stepped Frequency Microwave Radiometer (SFMR). This is an optional field new for 1999, and may be omitted depending on the version of software being run. If omitted, the rain rate field will also be omitted, and the <cr><cr><lf> sequence will occur immediately after the peak wind speed field (no trailing blank). When present, there will be three numeric characters, with leading zeros if required. If the SFMR wind can not be calculated during the sample interval, it (and the rain rate) will be coded as 999.
rrr	The rain rate in mm/hr, as measured by the SFMR. When present (see SFMR wind speed discussion above), there will be three numeric characters, with leading zeros if required. If rain rate can not be calculated it will be coded as 999.

Table G-5. TEMP DROP CODE

EXTRACT FROM: WMO-No. 306 MANUAL ON CODES

FM 37-X Ext. TEMP DROP - Upper-level pressure, temperature, humidity and wind report from a sonde released by carrier balloons or aircraft. See Figure G-4 for an example TEMP DROP message for tropical cyclone operations.

CODE FORM:

PART A

SECTION 1 M_iM_iM_jM_j YYGGI_d 99L_aL_aL_a Q_cL_oL_oL_oL_o MMMU_LaU_Lo

SECTION 2 99P_oP_oP_o T_oT_oT_{ao}D_oD_o d_od_of_of_of_o

P_lP_lh_lh_lh_lh_l T_lT_lT_{a1}D_lD_l d_ld_lf_lf_lf_l

P_nP_nh_nh_nh_nh_n T_nT_nT_{an}D_nD_n d_nd_nf_nf_nf_n

SECTION 3 88P_tP_tP_t T_tT_tT_{at}D_tD_t d_td_tf_tf_tf_t
or
88999

SECTION 4 77P_mP_mP_m d_md_mf_mf_mf_m (4v_bv_bv_av_a)
or
66P_mP_mP_m d_md_mf_mf_mf_m (4v_bv_bv_av_a)
or
77999

SECTION 10 31313

51515 101A_{df} A_{df} 0P_nP_nP_nP_n·
or

101A_{df} A_{df} P_nP_nh_nh_nh_nh_n
61616

62626

PART B

SECTION 1 M_iM_iM_jM_j YYGG8 99L_aL_aL_a Q_cL_oL_oL_o MMMU_LaU_Lo

SECTION 5 n_on_oP_oP_oP_o T_oT_oT_{ao}D_oD_o

n_ln_lP_lP_lP_l T_lT_lT_{a1}D_lD_l

$n_n n_n P_n P_n P_n \quad T_n T_n T_{an} D_n D_n$

SECTION 6 21212 $n_o n_o P_o P_o P_o \quad d_o d_o f_o f_o f_o$

$n_l n_l P_l P_l P_l \quad d_l d_l f_l f_l f_l$

SECTION 7 $n_n n_n P_n P_n P_n \quad d_n d_n f_n f_n f_n$
 31313 $s_{ra} r_{as} s_a s_a \quad 8GGgg$

SECTION 9 51515 $101A_{df} A_{df} \quad \text{or}$

$101A_{df} A_{df} \quad 0P_n P_n P'_n P'_n \quad \text{or}$

$101A_{df} A_{df} \quad P_n P_n h_n h_n h_n$

SECTION 10 61616

62626

PART ALPHA (A)

IDENTIFICATION LETTERS: $M_J M_J$

Identifier: $M_J M_J$ - Identifier for Part A of the report.

DATE/TIME GROUP: $YYGGI_d$

Identifier: **YY** - Date group

Identifier: **GG** - Time group

Identifier: I_d - The highest mandatory level for which wind is available.

LATITUDE: $99L_a L_a L_a$

Identifier: **99** – Indicator for data on position follows.

Identifier: $L_a L_a L_a$ – Latitude in tenths of degrees

LONGITUDE: $Q_c L_o L_o L_o$

Identifier: Q_c – The octant of the globe.

Identifier: $L_o L_o L_o$ – Longitude in tenths of degrees

MARSDEN SQUARE: $MMMU_{la} U_{lo}$

Identifier: **MMM** - Marsden square.

Identifier: $U_{la} U_{lo}$ – Units digits in the reported latitude and longitude.

SEA LEVEL PRESSURE: $99P_0 P_0 P_0 \quad T_0 T_0 T_0 D_0 D_0 \quad d_0 d_0 f_0 f_0$

Identifier: **99** – Indicator for data at the surface level follows

Identifier: $P_0 P_0 P_0$ – Indicator for pressure of specified levels in whole millibars (thousands digit omitted)

Identifier: $T_0 T_0 T_0$ – Tens and digits of air temperature (not rounded off) in degrees Celsius, at specified levels beginning with surface.

Identifier: **D₀D₀** – Dewpoint depression at standard isobaric surfaces beginning with surface level.

NOTE

When the depression is 4.9C or less encode the units and tenths digits of the depression. Encode depressions of 5.0 through 5.4C as 50. Encode depressions of 5.5C through 5.9C as 56. Dew point depressions of 6.0 and above are encoded in tens and units with 50 added. Dew point depressions for relative humidities less than 20% are encoded as 80. When air temperature is below –40C report **D_nD_n** as //.

Identifier: **d₀d₀** – True direction from which wind is blowing rounded to nearest 5 degrees. Report hundreds and tens digits. The unit digit (0 or 5) is added to the hundreds digit of wind speed.

Identifier: **f₀f₀** – Wind speed in knots. Hundreds digit is sum of speed and unit digit of direction, i.e. 295° at 125 knots encoded as 29625.

NOTE: 1. When flight level is just above a standard surface and in the operator's best meteorological judgment, the winds are representative of the winds at the standard surface, then the operator may encode the standard surface winds using the data from flight level. If the winds are not representative, then encode /////.

NOTE: 2. The wind group relating to the surface level (d₀d₀f₀f₀) will be included in the report; when the corresponding wind data are not available, the group will be encoded as /////.

STANDARD ISOBARIC SURFACES : P₁P₁h₁h₁ T₁T₁T₁D₁D₁ d₁d₁f₁f₁

Identifier: **P₁P₁** – Pressure of standard isobaric surfaces in units of tens of millibars.

(1000 mbs = 00, 925mbs = 92, 850mbs = 85, 700mbs = 70, 500mbs = 50, 400mbs = 40, 300mbs = 30, 250mbs = 25).

Identifier: **h₁h₁h₁** – Heights of the standard pressure level in geopotential meters or decameters above the surface. Encoded in decameters at and above 500mbs omitting, if necessary, the thousands or tens of thousands digits. Add 500 to hhh for negative 1000mb or 925mb heights. Report 1000mb group as 00/// ///// when pressure is less than 950mbs.

Identifier: **T₁T₁T₁D₁D₁** – Same temperature/dew point encoding procedures apply to all levels.

Identifier : **d₁d₁f₁f₁** – Same wind encoding procedures apply to all levels.

DATA FOR TROPOPAUSE LEVELS: 88 P_tP_tP_t T_tT_tT_tD_tD_t d_td_tf_tf_t

Identifier: **88** – Indicator for Tropopause level follows

Identifier: **P_tP_tP_t** – Pressure at the tropopause level reported in whole millibars. Report 88P_nP_nP_n as 88999 when tropopause is not observed.

Identifier: **T_tT_tT_tD_tD_t** – Same temperature/ dew point encoding procedures apply.

Identifier: **d_td_tf_tf_t** – Same wind encoding procedures apply.

MAXIMUM WIND DATA: 77P_nP_nP_n d_nd_nf_nf_n 4v_bv_bv_av_a

Identifier: 77 – Indicator that data for maximum wind level and for vertical wind shear follow when max wind does not coincide at flight. If the maximum wind level coincides with flight level encode as 66

Identifier: P_nP_nP_n – Pressure at maximum wind level in whole millibars.

Identifier: **d_nd_nf_nf_n** – Same wind encoding procedures apply.

VERTICAL WIND SHEAR DATA: 4v_bv_bv_av_a

Identifier: **4** – Data for vertical wind shear follow.

Identifier: **v_bv_b** – Absolute value of vector difference between max wind and wind 3000 feet BELOW the level of max wind, reported to the nearest knot. Use “/” if missing and a 4 is reported. A vector difference of 99 knots or more is reported with the code figure “99”.

Identifier: **v_av_a** – Absolute value of vector difference between max wind and wind 3000 feet above the level of max wind, reported to the nearest knot. Use “/” if missing and a 4 is reported. A vector difference of 99 knots or more is reported with the code figure “99”.

SOUNDING SYSTEM INDICATION, RADIOSONDE/ SYSTEM STATUS, LAUNCH TIME:

31313 s_rr_ar_as_as_a 8GGgg

Identifier: **s_rr_ar_as_as_a** - Sounding system indicator, radiosonde/ system status: s_ar_ar_as_as_a

Identifier: **s_a** - Solar and infrared radiation correction (**0** – no correction)

Identifier: **r_ar_a** – Radiosonde/sounding system used (**96** – Descending radiosonde)

Identifier: **s_as_a** – Tracking technique/status of system used (**08** – Automatic satellite navigation)

Identifier: **8GGgg** – Launch time

Identifier: **8** – Indicator group

Identifier: **GG** – Time in hours

Identifier: **gg** – Time in minutes

ADDITIONAL DATA GROUPS: 51515 101XX 0P_nP_nP_n

Identifier: **51515** – Additional data in regional code follow

Identifier: **10166** – Geopotential data are doubtful between the following levels 0P_nP_nP_n. This code figure is used only when geopotential data are doubtful from one level to another.

Identifier: **10167** – Temperature data are doubtful between the following levels 0P_nP_nP_n. This code figure shall be reported when only the temperature data are doubtful for a portion of the descent. If a 10167 group is reported a 10166 will also be reported. EXAMPLE: Temperature is doubtful from 540mbs to 510mbs. SLP is 1020mbs.

The additional data groups would be : 51515 10166 00251 10167 05451.

Identifier: **10190** – Extrapolated altitude data follows:

When the sounding begins within 25mbs below a standard surface, the height of the surface is reported in the format **10190 P_nP_nh_nh_nh_n**. The temperature group is not reported. EXAMPLE: Assume the release was made from 310mbs and the 300mb height was 966 decameters. The last reported standard level in Part A is the 400mb level. The data for the 300mb level is reported in Part A and B as 1019030966.

When the sounding does not reach surface, but terminates within 25mbs of a standard surface, the height of the standard surface is reported in Part A of the code in standard format and also at the end of Part A and Part B of the code in the format as **10190 P_nP_nh_nh_nh_n**.

EXAMPLE: Assume termination occurred at 980mbs and the extrapolated height of the 1000mb level was 115 meters. The 1000mb level would be reported in Part A of the code as 00115 ///// and in Part B as 10190 00115.

Identifier: **10191** – Extrapolated surface pressure precedes. Extrapolated surface pressure is only reported when the termination occurs between 850mbs and the surface. Surface pressure is reported in Part A as 99P₀P₀P₀ ///// and in Part B as 00P₀P₀P₀ //. When surface pressure is extrapolated the 10191 group is the last additional data group reported in Part B.

AIRCRAFT AND MISSION IDENTIFICATION: 61616 AFXXX XXXXX XXXXX OB X

Identifier: **61616** – Aircraft and mission identification data follows.

Identifier: **AFXXX** – The identifier AF for U.S. Air Force and the last three digits of the aircraft's tail number.

Identifier: **XXXXX XXXXX** – The identifier for the type of mission being flown.

If a training mission the mission identifier is **WXWXA TRAIN**. The fifth letter "A" is the only character that could possibly change. The "A" defining that the flight originated in the Atlantic basin. The letter "C" identifies the Central Pacific area and the letter "E" identifies the Eastern Pacific.

If an operational storm mission: the first two numbers Identifier the number of times an aircraft has flown this system and the second two numbers Identifier the system number. The last character again identifies the basin flown. The name of the storm would replace TRAIN.

EXAMPLE: AF968 0204A MARIE – Aircraft number 50968, this was the second flight into this system and the system was the fourth of the season. The system reached tropical storm strength and was named MARIE.

Identifier: **OB 14** – The observation (both vertical and horizontal) number as transmitted from the aircraft.

NATIONALLY DEVELOPED CODES: 62626

Identifier: **62626** – This is the remarks section. Only the remarks EYE, EYEWALL XXX, MXWNBND XXX, or RAINBAND will be used. If the remarks EYEWALL is used it will be followed by the radian to the eye center.

Identifier: **SPL XXXXNXXXXXW hmmm** - Impact location of the sonde based on its last GPS position and the splash time. The splash location will be recorded automatically by computer.

Identifier: **LAST WND XXX** - Height of the last reported wind. If a surface wind is reported the Last Wind remark is omitted. XXX will never be less than 13 meters

Identifier: **MBL WND dddff** - The mean boundary level wind. The mean wind in the lowest 500 meters of the sounding

Identifier: **AEV XXXXX** - This is the software version being used for the sounding.

Identifier: **DLM WND dddff bbbttt** - The Deep Layer Mean wind. It is the average wind over the depth of the sounding. Where dddff is the wind averaged from the first to the last available wind (these would correspond to the first and last significant levels for wind); ttt is the pressure at the top of the layer, and bbb is the pressure at the bottom of the layer (in whole mbs, with thousands digit omitted).

Identifier: **WL150 dddff zzz** - Average wind over the lowest available 150 m of the wind sounding. Where dddff is the mean wind over the 150 m layer centered at zzz m.

PART ALPHA (B)

DATA FOR SIGNIFICANT TEMPERATURE AND RELATIVE HUMIDITY LEVELS SIGNIFICANT ISOBARIC LEVELS:

n₀n₀P₀P₀P₀ T₀T₀T₀D₀D₀

IDENTIFICATION LETTERS: M_JM_J

Identifier: **M_JM_J** - Identifier for Part B of the report.

DATE/TIME GROUP: YYGG8

Identifier: **YY** - Date group

Identifier: **GG** - Time group

Identifier: **8** - Indicator for the use of satellite navigation for windfinding.

LATTITUDE: 99L_aL_aL_a (Same as Part A)

LONGITUDE: QcL_oL_oL_oL_o (Same as Part A)

MARSDEN SQUARE: MMMU_{ia}U_{io} (Same as Part A)

SEA LEVEL PRESSURE: n₀n₀P₀P₀P₀ T₀T₀T₀D₀D₀

Identifier: **nono** – Indicator for number of level starting with surface level. Only surface will be numbered as “00”.

Identifier: **P₀P₀P₀** – Indicator for pressure of specified levels in whole millibars (thousands digit omitted)

Identifier: **T₀T₀T₀** – Tens and digits of air temperature (not rounded off) in degrees Celsius, at specified levels beginning with surface.

Identifier: **D₀D₀** – Dewpoint depression at standard isobaric surfaces beginning with surface level. Encoded the same as Part A.

FOR STORM DROPS ONLY. If SLP is less than 950mb encode the 1000mb group as 00/// //// // //. When the SLP is between 950mb and 999mb encode 1000mb as 00PoPoPo //// //// (500 meters are added to height below surface).

DATA FOR SIGNIFICANT WIND LEVELS: $n_0n_0P_0P_0d_0d_0f_0f_0$

Identifier: n_0n_0 – Number of level starting with surface level. Only surface will be numbered as “00”.

Identifier: $P_0P_0P_0$ – Pressure at specified levels in whole millibars.

Identifier: d_0d_0 – True direction from which wind is blowing rounded to nearest 5 degrees. Report hundreds and tens digits. The unit digit (0 or 5) is added to the hundreds digit of wind speed.

Identifier: $f_0f_0f_0$ – Wind speed in knots. Hundreds digit is sum of speed and unit digit of direction, i.e. $29\overline{5}^\circ$ at 125 knots encoded as 29625.

Same notes in Part A apply.

31313, 51515, 61616, 62626 – Repeated from Part A.

FIGURE G-4. EXAMPLE TEMP DROP MESSAGE FOR TROPICAL CYCLONES

UZNT13 KNHC 061851

XXAA 56187 99251 70786 08158 99990 26444 ///// 00540 26247 13070 92827

22856 12565 85560 17834 13075 70200 13045 13585 88999 77999

31313 09608 81828

51515 10166 00270

61616 AF968 0204A MARIE OB 14

62626 MXWNBND SPL 2525N07835W 1826 LST WND 012 MBL WND 13065

AEV 20200 DLM WND 13075 990699 WL150 13070 843

XXBB 56188 99251 70786 08158 00006 26444 11000 25841 22991 24657 33860

18233 44719 15657 55699 13045

21212 00990 ///// 11983 13570 22959 13065 33865 12560 44787 13075 55719

13575 66699 13585

31313 09608 81828

51515 10166 00270

61616 AF968 0204A MARIE OB 14

62626 MXWNBND SPL 2525N07835W 1826 LST WND 012 MBL WND 13065

AEV 20200 DLM WND 13075 990699 WL150 13070 843